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TWO NEW MYRMECOPHILOUS GENERA OF ABERRANT PHORIDÆ FROM TEXAS.[1]

CHARLES THOMAS BRUES.

THE discovery of two new genera of myrmecophilous diptera allied to the Stethopathidæ, in Texas, is entirely unexpected. That a family of wingless Diptera hitherto represented by a small group of genera in the Old World should suddenly appear in North America is, to say the least, a very unusual occurrence.

The new genera are also very interesting from a taxonomic point of view, as they show very clearly the affinities of the Stethopathidæ and Phoridæ, which have hitherto appeared somewhat doubtful.

Last October, while collecting ants in one of the pecan groves upon the outskirts of Austin, Texas, Dr. Wheeler of the University of Texas found in a nest of *Solenopsis geminata* Fabr. several specimens of a peculiar dipteron with rudimentary wings. Upon closer examination they seemed to be Phoridæ, although their habitus was extremely like that of the Stethopathidæ, from which they were easily distinguished by their halteres and small wings.

[1] *Contributions from the Zoölogical Laboratory of the University of Texas*, No. 15.

About a month later Dr. Wheeler called my attention to a number of somewhat similar flies in a nest of *Eciton cæcum* Latr. which had been in the laboratory for some time. These also proved to be Phoridæ, but of a still more degenerate type.

A more careful examination has shown that these two genera are referable to the Stethopathidæ, but at the same time are evidently degenerate Phoridæ, so that the former family must be included in the Phoridæ. Such an addition does not make the family an incongruous one. When Loew ('57) placed his African Psyllomyia in the Phoridæ he made a statement equally applicable to the present addition:

"Wenn irgend etwas geeignet ist über die verwandtschaftlichen Beziehungen der Phoriden eine Aufklärung zu geben, so sind diess Arten, welche so sehr von dem Typus der in der alten Gattung *Phora* vereinigten abweichen, wie die oben beschriebene, und welche doch der Familie der Phoriden mit so bestimmt ausgesprochener Entschiedenheit angehören wie sie.

"Leider muss ich bekennen, dass die oft wiederholte Vergleichung der *Psyllomyia testacea* mit Diptern gar verschiedener Familien mir nach dieser Richtung hin durchaus kein positives Resultat gegeben hat, so dass ich die Familie der Phoriden von allen andern Familien der Diptern noch so scharf getrennt und so unvermittelt zwischen ihnen stehen sehe, wie zuvor."

With the discovery of the still more degenerate forms his remarks lose none of their pertinence.

The family Stethopathidæ was established by Wandolleck in 1898 ('98b) for the reception of several genera of Diptera which are remarkable for the total absence of wings and halteres, besides other less striking peculiarities. Two of the genera which he describes had been previously described by Dahl ('97) as sexes of a single species which he named *Puliciphora lucifera* and placed among the Phoridæ. He, however, considered at the same time that they were a connecting form between the Aphaniptera and Diptera and accordingly announced that he had solved the much-vexed question of the relation of the fleas with the Diptera.

Wandolleck later showed ('98a) that this idea is wholly erroneous as far as the Aphaniptera are concerned, and that

they are in no way related to them, nor, on the other hand, did he consider them to be Phoridæ.

His third genus, which he leaves without a name, had been previously named in his honor by Cook ('98).

The most important characters of the Stethopathidæ, as defined by Wandolleck, are the total absence of wings and halteres, the strongly reduced thorax, very small eyes, large coxæ, and small external genital organs of the female.[1]

Recently Wasmann has described a genus of termitophilous Diptera ('00a) which agrees with the Stethopathidæ in all essentials, except that they possess rudimentary wing-like appendages and a slightly larger thorax. These are characters that would not warrant the erection of another family for their reception. Moreover, the presence of rudimentary thoracic appendages places them still closer to the Phoridæ.

The two Texan genera approach the true Phoridæ even more closely, since one of them possesses both halteres and rudimentary wings, and both have the large macrochætæ of the body hairy, a character which Wasmann has pointed out as distinguishing the Stethopathidæ and Phoridæ. In both of these forms the abdomen is almost completely membranous. The African genus Psyllomia, however, has an abdomen of the true phorid type, while it agrees with one of the new genera, Commoptera, in having rudimentary wings, as well as in the structure of the head. The external sexual organs of the female are so clearly of the phorid type that they present no important deviation.

Through these forms we can pass without any great gaps from the Stethopathidæ to the Phoridæ, and as such is the case, *the family Stethopathidæ is certainly untenable, and the genera hitherto placed there, together with Psyllomyia and the*

[1] I have not considered the form of the mouth-parts in Wandolleck's three genera, which he believes to be entirely different from those of the Phoridæ and all other Diptera. He himself says, however, that Dahl, who has spent much time in studying the Phoridæ, considers them as phorid mouth-parts. He says: "Ich zeigte die Zeichnungen Dahl, der sich seit Jahren mit Phoriden beschäftigt, er erkannte sie sofort als Phoridenmundtheile an. . . ." I think Wandolleck must have exaggerated the extent and importance of the variation in the mouth-parts, for the two Texan genera have typical phorid mouth-parts, often, however, shrunken and distorted in alcoholic specimens.

two described below, had best be considered as the subfamily Stethopathinæ of the Phoridæ.

It does not seem probable that the forms have had a common origin however; even their distribution would preclude this in the case of such a recent group. On the other hand, there seem to be several independent lines of descent which we can to some extent suggest. In Psyllomyia the degeneration consists in the reduction of the eyes, absence of ocelli, and reduction of wings. In Commoptera the eyes are larger, the ocelli present; but the abdomen is extremely degenerate in structure, being almost wholly membranous. Ecitomyia could be more easily derived from forms like Commoptera, as it has very rudimentary wings, no halteres, smaller eyes, smaller thorax (without scutellum), and about equally degenerate abdomen. The degeneration has gone furthest in the genera from the Bismarck Archipelago and west Africa. Here the thorax is exceedingly small, the wings and halteres completely lost, the eyes very small, and the abdominal segments more or less membranous. Of these Stethopathus alone has retained distinct ocelli. Wasmann's Termitoxenia has the immensely swollen abdomen so characteristic of all termitophiles, and a greatly modified head. It does not approach closely to any of the other genera.

The following table, showing the order of degeneracy with regard to different structures in the genera of the Stethopathinæ as compared with Phora, will serve to emphasize the great disparity between the genera. *Phora* is placed at the top in each case and the most degenerate genus at the bottom.[1]

WINGS.	EYES AND OCELLI.	ABDOMEN.	THORAX.
Phora	Phora	Phora	Phora
Psyllomyia	Commoptera	Psyllomyia	Commoptera
Commoptera	Termitoxenia	Chonocephalus	Psyllomyia
Ecitomyia	Stethopathus	Stethopathus	Termitoxenia
Termitoxenia	Psyllomyia	Ecitomyia	Ecitomyia
Stethopathus	Wandolleckia	Commoptera	Stethopathus
Wandolleckia	Ecitomyia	Wandolleckia	Wandolleckia
Chonocephalus	Chonocephalus	Termitoxenia	Chonocephalus

[1] Where ocelli or wings are absent I have judged by the size of the eyes and the thorax.

Still more remarkable is Ænigmatias, represented by *Æ. blattoides* Meinert from Denmark, which does not seem to be closely related to the Stethopathinæ, although I have unfortunately not had access to the original description of Meinert ('90). Its habitus is certainly entirely different from that of any of the genera here mentioned. *Platyphora lubbockii* Verrall has been suggested as the possible male of Ænigmatias, but that is very problematical.

Throughout the winter we had been searching in vain for the males of Ecitomyia, which is very common in the nests of *Eciton cœcum*, but not until spring (February 3) were we able to obtain them. On that day we obtained two specimens from different nests in which the females were abundant. A glimpse at one of them immediately justified any surmises made as to their phorid character, for the males, although much like the females, possessed fully developed wings with the peculiar phorid venation and large halteres!

Such a remarkable amount of variation in usually stable morphological characters may be best explained by the great tendency of all degenerate structures to vary in an unusually high degree, and by a great power of adaptation in the Phoridæ.

The habits of only four of the genera are known with certainty. They are all myrmecophiles or termitophiles. A fifth, Wandolleckia, lives apparently ectoparasitically upon large west African land snails (*Achatina varicgata* Roissy).

Their geographical distribution is extremely peculiar and is a case of remarkable discontinuous distribution not due to the great age of a certain type, for it does not seem possible to regard them as an old group, but rather as several independent and to some extent conveying lines of degeneration. This view is strengthened by the above-mentioned impossibility of showing any interrelation of the genera.

The following dichotomy will serve for the identification of the genera thus far known.

STETHOPATHINÆ.

Wingless or with rudimentary wings, eyes reduced, abdominal plates usually much reduced, coxæ very long, face deeply concave, eggs usually very large and causing an enlargement of the abdomen. Males, as far as positively known, easily correlated with the females, but much like the males of the Phorinæ.

GENERA OF STETHOPATHINÆ (FEMALES).[1]

1. Wings and halteres absent 5
   Either wings or halteres or both present 2
2. Both wings and halteres present, the former abbreviated . . 3
   Either wings or halteres present, never both 4
3. Arista of antenna dorsal, abdomen strongly chitinized throughout, proboscis much longer than height of head, very slender
   Psyllomyia Lw.
   Arista terminal, abdominal segments small, the greater part of the abdomen membranous, proboscis shorter than height of head, stout
   Commoptera *gen. nov.*
4. Abdomen greatly swollen, its apical segments bent forward on the ventral side of abdomen. Wings absent, halteres present
   Termitoxenia Wasmann
   Abdominal segments normal in position, wings present, halteres absent
   Ecitomyia *gen. nov.*
5. Ocelli present . . . . . Stethopathus Wand.
   Ocelli absent 6
6. Head longer than wide, subtriangular, palpi when viewed from above extending far beyond anterior margin of head. Two macrochætæ on posterior margin of head . . . . Wandolleckia Cook
   Head wider than long, trapezoidal, palpi not extending forward beyond front margin of head . . . . . Chonocephalus Wand.

If we desire to consider Ænigmatias as belonging here, it may be separated from all the other genera by its stout blattid-like form, with the thorax as wide as the abdomen. The problematical male (Platyphora) differs from the male of Ecitomyia in having no macrochætæ on the dorsum of the thorax.

[1] The male of only one genus (Ecitomyia) is known and it may be recognized by the diagnosis given farther on.

PSYLLOMYIA LOEW.

Head swollen, lentiform, completely chitinized. Eyes extremely small, somewhat wider than high, situated on the sides of the head. Ocelli absent. Antennæ two-jointed, only of medium size, each situated in a cavity, separated by the front margin of the head, which extends somewhat between them. Arista very thickly clothed with moderately long hairs. Palpi projecting, not very stout, bristly along the lower side and at the tip. Proboscis very long, geniculate, without distinct labellæ. Thorax rounded. Abdomen and legs as in Phora, the latter very bare, only at the tips of the four posterior tibiæ, with short, small bristles. Wings abbreviated, leathery, resting upon the dorsum of the abdomen and having the general appearance of short elytra (about as in Meloë). They have indications of three very thick, rib-like longitudinal veins, which are beset with small black bristles, some of which are noticeable because of their much greater length. Halteres beneath the wings, almost rudimentary.

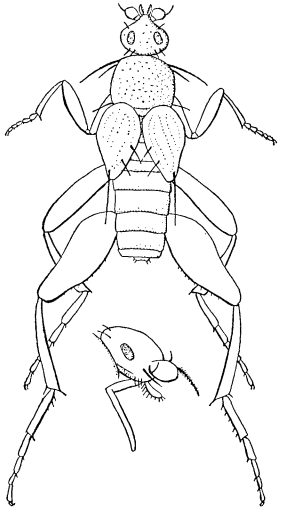

FIG. 1.—*Psyllomyia testacea* LW., ♀. (After Loew.)

Psyllomyia testacea Lw. (Fig. 1). Length 1.75 mm. Pale brownish yellow. Arista and wings, with the exception of the longitudinal veins, more yellowish white; the entire abdomen black. The entire upper side of the head finely punctured and covered with hardly perceptible hairs; besides these there are two posteriorly directed black macrochætæ on the extreme anterior part of the head, two anteriorly directed ones on each side close to the base of the proboscis, one anteriorly directed one immediately in front of the eye, and four posteriorly directed ones upon the occiput, close to the rather acute margin of the head. Thorax with scattered black bristles, one of especially large size on the side of the thorax at the upper part of the front coxa. On the wings two bristles are especially large, one of them on the inner margin, the other near the apex.

The specimens described by Loew were collected in Kaffir Land, Africa. Of all the genera this most closely resembles the Phorinæ, yet it shows undoubted affinities with Commoptera. The long proboscis is apparently quite different from those of the other genera.[1] The antennæ have a dorsal arista,

[1] Wasmann, however, mentions that Dorniphora Dahl, one of the Phorinæ, possesses a somewhat similar proboscis.

which is evidently homologous to the three apical joints in the antennæ of the other genera.[1] Such a variation in the insertion of the arista is seen also in the Phorinæ. The palpi and eyes are very small. The wings are shaped much as in Commoptera, but are almost free from bristles along the costa. The legs are of the usual phorid type, and judging from the figure the coxæ must be exceedingly lengthened.

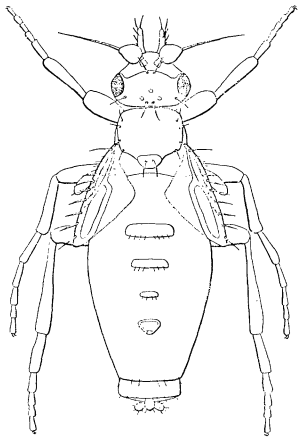

FIG. 2. — *Commoptera solenopsidis*, n. sp. Female, dorsal view.

Nothing whatever was known by Loew of the habits of this peculiar form, but Wasmann has mentioned it ('00b) as the guest of a south African doryline ant (*Dorylus helvolus* Linn.). He also includes in his list of the guests of the South-American *Eciton predator* "Phorid *N.G. n. sp.* (prope *P. testacea* Lw.), *S. Catharina*."

COMMOPTERA SOLENOPSIDIS (*gen. et sp. nov.*).

Female (Figs. 2 and 3). Length 1.5 mm. Abdomen 1.01 mm. Thorax .26 mm. Head .45 mm. Halteres .19 mm. Pale yellow, head somewhat darker, and abdomen somewhat lighter, legs concolorous with thorax. Body everywhere more or less covered with fine hairs. Head, seen from the side, oval. Vertex gently descending, about two-thirds as long as the mesonotum; face as long as the mesonotum, the antennæ inserted low down close to the mouth, in elongate vertical depressions which are quite shallow. Antennæ of the usual form, arista terminal, strongly pubescent. Eyes oval, one-half as high as the head and two-thirds as wide as high, with the ommatidia separated and convex. They are

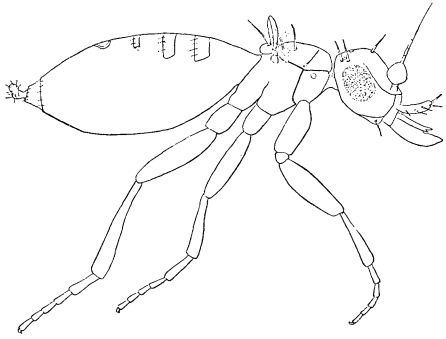

FIG. 3. — *Commoptera solenopsidis*, n. sp. Female, side view.

[1] Wandolleck speaks of them as antennal joints, but such a nomenclature seems inconsistent with the one usually adopted.

placed slightly above the middle of the head. Ocelli large and well developed, occupying their usual position in a triangle upon the vertex. Palpi as long as eye, small and slender, with the usual macrochætæ which are also smaller. Proboscis two-thirds as long as head, stout and thick (Fig. 4). Cheeks each with a large, downwardly directed macrochæta. A pair of closely approximated, anteriorly directed bristles on anterior margin of front; another posteriorly directed pair on the posterior margin of the head; and a third outwardly directed pair near the posterio-lateral corners of the head. Mesonotum somewhat wider than long,

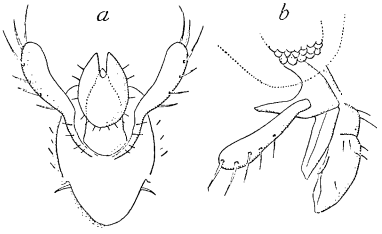

FIG. 4.—Mouth-parts of *Commoptera solenopsidis*, n. sp. *a*, ventral view; *b*, lateral view.

with four outwardly directed marginal macrochætæ on each side. Scutellum small, convex, much rounded behind, less so in front, projecting somewhat over the metathorax behind, with a pair of strong approximated median macrochætæ. Posterior part of metathorax produced back into the abdomen like a very large scutellum. Seen from the side the thorax is oval, not much larger than the head. The anterior coxæ are exceedingly large and freely movable. The other coxæ smaller, more or less connate with the thorax, the hind pair extending back beneath the base of the abdomen. Prothoracic stigma large and distinct. Wings short, less than one-third as long as the body, rather narrow and pointed, subtriangular in outline (Fig. 5). Along the costa are two rows of stout macrochætæ; elsewhere the wings are covered with fine, short hairs. Veins not sharply distinguishable from the surrounding membrane, consisting of two longitudinal veins which coalesce at the tip of the wing. Toward the base of the wing the first furcates, as does also the second. The anterior branch of the second vein unites with the posterior branch of the first. Posterior branch of second vein evanescent. Two vestigial posterior veins are present also. Halteres immediately behind the wings large, consisting of three distinct joints, the basal two small, quadrate; the third, large, stout, oval (Fig. 5). The third joint is almost as large as the palpi and flattened behind, so that a sharp edge separates the plane part from the remainder of the joint. Abdomen elongate oval, somewhat depressed, finely hairy, membranous except for the small dorsal plates, which are extremely rudimental. The first is a wide band, extending only one-third

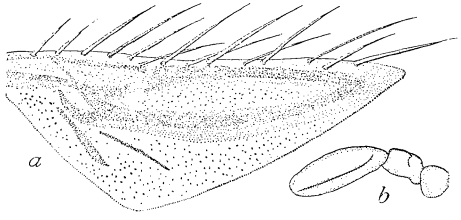

FIG. 5.—*Commoptera solenopsidis*, n. sp. *a*, wing; *b*, halter.

across the abdomen; the second, four times as wide as long, oval; the third, similar and much smaller; fourth, triangular, with a large pit in the center. Sexual organs of the usual form. The central axis is broadly rounded and bisetose at tip; lamellæ short, club-shaped, and rounded at the tips, quite bristly. Last two abdominal segments with rows of marginal bristles. The last two segments of the abdomen are retractile, as in Ecitomyia, and capable of being exserted to a considerable extent. Legs moderately stout. Hind metatarsi flattened, and with regular rows of transverse macrochætæ.

Three female specimens found in a nest of *Solenopsis geminata* Fabr., at Austin, Texas, Oct. 24, 1900, by Dr. Wm. M. Wheeler.

The structure of Commoptera is on the whole more degenerate than that of Psyllomyia. The eyes are larger and the ocelli present, but the swollen membranous abdomen and general habitus are at least a greater departure from the phorid type, if not a mark of degeneracy.

The head and its appendages are much as in the genera described by Wandolleck. The eyes are, however, less reduced and the ocelli nearly of normal size. A most remarkable difference is seen in the proboscis, which is not long as in Psyllomyia. The mouth-parts do not differ to any extent from those of some Phoras which I have examined.

The thorax and its appendages present nothing new, except the peculiar condition of the wings. At first I thought it possible that the wings were normally of the usual size and had been bitten off around the edges. But this view is disproved by two facts. In the first place, the wings are symmetrical and have the edges perfectly continuous. In only two wings (out of six) did there seem to be any irregular or notched places along the posterior margin. Secondly, the extreme activity of the flies would make it impossible for the Solenopsis, although it is quite an active ant, to gnaw off the wings so as to present even a semblance of the perfect symmetry exhibited. We are then forced to conclude that such abortion is natural and that the wings have been decreased in size on account of the inconvenience they presented to the fly while moving about in the galleries of the Solenopsis nest. Wings would indeed be a great inconvenience in moving about in the narrow galleries and quite an unnecessary burden, when the legs are adapted to such wonderfully quick motions.

The condition of the abdomen is also remarkable. The segments have no doubt been reduced, independently of the secondary swollen condition due to the immense eggs. Such small abdominal plates fitted together in their normal position would form an abdomen so utterly at variance with the size required to perform its natural functions that we must consider the segments reduced and the abdomen also enlarged, probably by post-metamorphic growth. The difference in the size of the abdomen in different specimens of Ecitomyia shows that a considerable post-metamorphic enlargement occurs in that species. The external sexual organs do not depart from those of Phora, except that they may be slightly reduced in size. The fourth abdominal segment differs from all the others in having not a dorsal plate, but a chitinous ring, triangular in shape and surrounding a membranous patch which probably has a glandular function.[1]

There can be no doubt that this peculiar insect is a true myrmecophile, as the nest in which they were found contained numerous individuals, most of which escaped on account of their extreme activity. Although we have examined a great number of similar Solenopsis nests, we have seen no other specimens, so that, in this locality at least, it is much rarer than the genus living with Eciton.[2]

ECITOMYIA WHEELERI *gen. et sp. nov.*

Female (Figs. 6 and 7). Length 1.20 mm. Abdomen .93 mm. Thorax .16 mm. Head .14 mm. Wings .14 mm. Head and thorax yellowish brown, much darkened above. Abdomen yellowish white, its small dorsal plates darker, the first almost piceous. Legs concolorous with the lower portions of the thorax. Head, seen from the side, subtrapezoidal, the front gradually descending, nearly as long as the dorsum of the thorax. Height of antennal cavity about equal to the front, about one-third as deep as high, regularly arcuate. The antennæ (Fig. 8) arising near the base of the cavity, of typical form: first joint small; second, large globose, obtusely pointed at tip; first joint of arista small, distinct; second, longer; third, nearly equal

[1] Owing to the limited number of specimens which we have of this species, I could not examine its structure. It is no doubt similar to the one described at length under Ecitomyia.

[2] Since writing the above, I captured another specimen in a nest of the same ant (April 6th).

to first and second together; the terminal slender portion not very distinct from the third joint, distinctly plumose. Eyes slightly smaller than second antennal joint, oval, with about twenty facets. Palpi rather slender, arcuate near base, as long as the front, bearing six strong macrochætæ laterally and a few other weaker ones. All of them, especially the larger ones, distinctly and finely hairy.

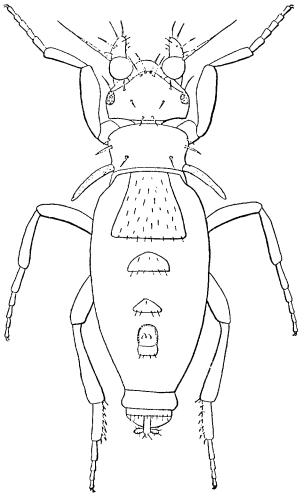

FIG. 6. — *Ecitomyia wheeleri*, n. sp. Female, dorsal view.

Thorax smaller than the head when viewed from the side and longer than high, the suture between the pro- and mesothorax distinct above on the pleuræ, prothoracic stigma distinct (Fig. 9, *d*). Mesopleuræ distinctly hexagonally areolated below. Wings a little longer than the thorax, slender, flat, and obtusely pointed at tip; covered on the dorsal side with short bristly hairs. Dorsum with six macrochætæ: two small humeral, two larger post-humeral, and two widely separated post-median ones. Metathorax small, concealed to a great extent by the abdomen, which extends over it almost to the meso-metathoracic suture; viewed from above through the abdominal wall, it appears elongate, subtriangular, and rounded at the apex. Legs rather stout, especially the coxæ and femora. Anterior coxæ two-thirds as long as the femora and freely movable at base; the four posterior ones more or less connate and not so large. Posterior metatarsi enlarged and flattened, bearing six transverse rows of stout bristles (Fig. 9, *c*). One well-developed spur on posterior tibiæ. Legs everywhere covered with short hairs.

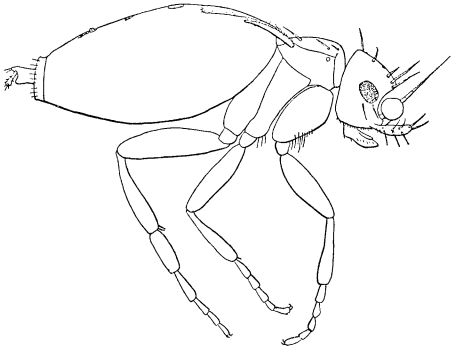

FIG. 7. — *Ecitomyia wheeleri*, n. sp. Female, side view.

Abdomen elongate, oval, acuminate, capable of being exserted at the tip, so that the last three segments may be retracted into the abdomen or pushed out for a distance equal to one-half that of the remainder of the abdomen. When retracted it is about twice as long as the head and thorax taken together. It is almost wholly membranous, only the very small dorsal plates being chitinized. First dorsal plate trapezoidal, as wide as long, and

narrowed basally; second, semicircular; third, subtriangular; fourth, twice as wide as long, rectangular. All except the first are almost rudimental. Just in front of the fourth plate there is a horseshoe-shaped piece of chitin, enclosing a pit from which projects a papilla from the interior of the abdomen (Fig. 9, *e*). Exterior sexual organs consisting of a stout longitudinal axis, obtusely pointed at tip, where it bears two macrochætæ (Fig. 9, *a*). The two lamellæ are attached laterally upon the sides of the central piece near the tip. Lamellæ about as long as the diameter of the central axis, elongate, gradually enlarged toward the tip, where they are rounded; covered with numerous stout bristles. All the apical segments of the abdomen bear several marginal macrochætæ.

FIG. 8.—*Ecitomyia wheeleri*, n. sp. Antenna.

Male (Fig. 10). Length .68 mm.; of wing the same. Body alutaceous. Thorax infuscated above. Abdomen piceous on basal three-fourths above, except on the anterior margins of the segments, where it is much paler. Antennæ, palpi, face, and legs pale testaceous. Anterior tibiæ black, except at extreme base. Hypopygium more or less black. Wings hyaline, veins pale. Head shaped much as in the female; eyes larger, not much smaller than in species of Phora; ocelli present, large, in a triangle on the vertex. Head seen from the side, about twice as high as long. Chætotaxy the same as that of the female, except that the most anterior pair of frontal bristles is shorter. The macrochætæ on the underside of the palpi are also somewhat weaker. Antennæ as in the female. Thorax arched in front, more than twice as long as the head. Scutellum well developed, bearing two strong discal macrochætæ. Dorsum with three marginal macrochætæ and a pair just before the scutellum. Legs longer and more slender than those of the female. Coxæ bristly at tip, hind trochanters each with a pair of very strong recurved spine-like macrochætæ. Wings large, as long as the body, with a stout longitudinal vein which meets the

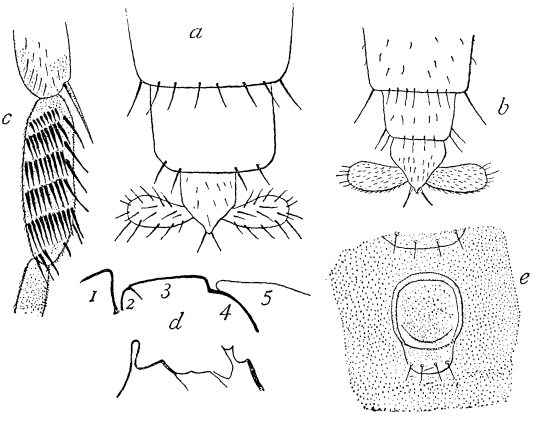

FIG. 9.—*Ecitomyia wheeleri*, n. sp. *a*, apex of abdomen, ♀; *b*, apex of abdomen, Phora sp. (?), ♀; *c*, hind metatarsus, ♀; *d*, diagrammatic median sagittal section of ♀; *1*, head; *2*, prothorax; *3*, mesothorax; *4*, metathorax; *5*, abdomen.

thickened costal margin near the middle of the wing, and three faint, oblique longitudinal veins. Costal vein bristly along its entire length. Halteres about as long as the hind metatarsus, distinctly three-jointed. Abdomen with six segments, the basal ones longest. It is chitinized above and membranous beneath. Hypopygium large, exserted, asymmetrical.

Described from numerous female and two male specimens collected at Austin, Texas, in the nests of *Eciton cœcum* Latr. and *Eciton schmitti* Emery, from October to February, the males only in February.

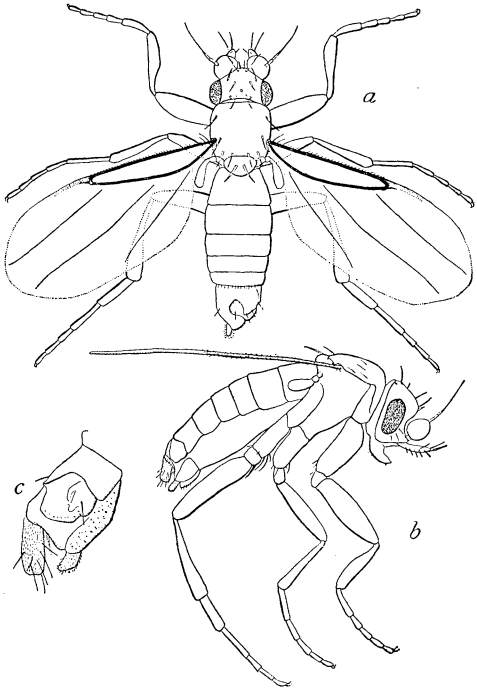

FIG. 10.—*Ecitomyia wheeleri*, n. sp., ♂. *a*, dorsal view; *b*, side view; *c*, hypopygium.

The head of Ecitomyia is much as in Commoptera, but is sharply angled at the posterio-lateral corners and longer on the vertex. The palpi are flattened and appear much thicker when seen from above. The eyes are considerably smaller than in Commoptera. The thorax is much wider than long and has no scutellum, while the metathorax is wholly concealed in the basal part of the abdomen. The appendages upon the dorsum of the thorax in the female of this species do not seem to be homologous with the similarly placed ones in Termitoxenia. They approach more closely to wings, while those in Termitoxenia are, in structure at least, like the halteres of Commoptera. That these appendages are wings is proved by their insertion evidently anterior to the meso-metapleural suture, and still more positively by their structure, as the homology of the thoracic segments is somewhat obscure. They are strap-shaped, and not round in cross-section; the dorsal side is

bristly while the ventral side is bare; they show no traces of any separate segments and articulations, whereas the halteres of Commoptera do. The presence of wings and absence of halteres are peculiar to this genus among all Diptera. Wings are often absent and rarely both wings and halteres, but in no other case are wings present without halteres. In *Eretmoptera browni* Kellogg ('00) the wings are much as in Ecitomyia, but the halteres, although somewhat reduced, are distinct. In Termitoxenia Wasmann considers the appendages of the thorax to be attached to the prothorax, which he believes to be greatly enlarged and to cover the dorsum of the entire thorax. This would certainly be an unusual development of the prothorax, and it seems much more reasonable to suppose that they are the halteres, or perhaps possibly reduced wings. It seems highly improbable that a dipteron prothorax should have suddenly become so large and have developed wing-like appendages. On the other hand, they are quite similar to the halteres of Commoptera, and Wasmann's appendices thoracicales could be easily derived from halteres. In Termitoxenia they seem to have taken on a new function, at least Wasmann so supposes from their peculiar form. He suggests that they may be of use as a means of attaching the animal to the body of the termite in order to be carried about.

The abdomen has somewhat larger dorsal plates than Commoptera, but they are nevertheless very much reduced, being scarcely visible from the side. The pit and papilla upon the anterior part of the fourth dorsal plate are shown in sections to be connected with a remarkable gland in the abdomen. The dorsal plate of the segment is continued forward to form a strongly chitinized ring which passes over into the plate posteriorly. Inside of this ring the integument is very thin and delicate, and is folded in to form a pit, surrounded on all sides by firm chitin. The bottom of the depression is swollen out in the middle to form a papilla, which is evidently to some extent eversible, as it shows a different form in almost every specimen. It often appears distinctly bifurcate at the tip. The tip of the papilla is covered with fine hairs and usually shows some refractive granules, most probably urates of some sort.

Internally the gland has a peculiar and complex structure (Fig. 11). The secretion seems to be formed in two elongate oval bodies lying in the dorsal part of the abdomen, and it is apparently carried through some intermediate, somewhat reticulately arranged cells to the surface of the papilla, which is lined with several layers of cells of varied size and form. The gland may perhaps supply some pleasant secretion for the ants, like the tufts of hairs developed in myrmecophilous Coleoptera, although I have not been able to decide by observation. I can find no reference to similar glands in any other insect, and hope at some future time to study them in detail.[1]

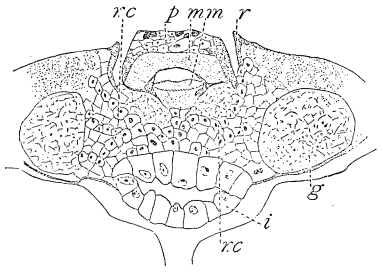

FIG. 11. — *Ecitomyia wheeleri*, n. sp. Cross-section of abdomen through gland. *g*, gland proper; *r.c*, reticulate cells; *r*, chitin ring; *p*, eversible papilla; *m*, membrane covering papilla and extending into abdomen; *i*, intestine.

We have found this species a great number of times, always associated with species of the ant genus Eciton. *Eciton cœcum* Latr., a totally blind species, which tunnels in the earth, seems to be its favorite host, although we found it upon one occasion in a nest of *E. schmitti* Emery, a species with very different habits, which lives in compact masses under stones, making its trips in search of food above ground.

The Ecitomyias are exceedingly quick and have the habit of darting rapidly about in zigzag paths in the way characteristic of many myrmecophiles. In the nests of *E. cœcum* they frequent those parts of the nest containing the greatest number of ants, being very often seen running along the galleries of the ants, into which they rapidly disappear when the nest is disturbed. Those occurring with *E. schmitti* seem to stay at a greater distance from the main body of the ants, but this species makes

[1] A very curious coincidence occurs in a new genus of wingless Proctotrupidæ which occurs in the nests of *Eciton cœcum*. *It also possesses a sharply defined roughening of the integument at exactly the same place that the gland of Ecitomyia has its opening!* I am sure, however, that there is no gland in connection with it. Can it be possible that this has any connection with some way these blind ants may have of recognizing their habitual nestmates?

large clusters and it might be dangerous for a myrmecophile to venture into these. It apparently prefers to move about in the vacant galleries of the nest.[1]

Some females which were placed in an artificial nest containing a number of *E. cœcum* workers soon made themselves at home and appeared much more at ease than the ants, which appear to be quite stupid and slow in adapting themselves to new conditions. Some of the flies preferred to rest upon the glass walls of the nest away from the ants. Others darted among the ants in the largest groups, while the ants regarded them without the slightest animosity. Any other fly or small insect introduced into the nest was viciously attacked by the ants and soon killed to serve as food for a large group of ants which had taken part in its destruction. Even dead legs and wings were picked up and carried about. Some Ecitomyias, however, which had presumably died a natural death, were not molested by the ants, and remained for a long time undisturbed. One of the Ecitomyias was apparently feeding upon some deposit left by the ants as they moved about, and it also approached some of the less excited ones after the manner of Myrmecophila, but I could not see that it obtained anything from the bodies of the ants.

Throughout the winter we had seen the females in almost every large nest which we examined, but although probably half a hundred nests were seen during that time, not until February did we positively find any males. In a large flourishing nest of *E. cœcum* which extended under stones for a distance of nearly twenty feet, we found numerous female and two male specimens. Although the male has ample wings, it did not attempt to fly, but hopped about in a similar but much less agile manner than the female, which is often exceedingly quick and hard to catch. The male does not hold the wings flat

[1] We have not been able to observe how they manage to follow the ants about as they make their regular changes of nest, for this ant does not remain in the same nest for any length of time, except probably during the breeding season. Other myrmecophiles of this species (*e.g.*, Staphylinidæ) march along in procession with their hosts as they make their curious journeys. As *E. cœcum* moves only by tunneling underground, they would experience no difficulty in keeping company with the ants.

upon the back, but keeps them in a slanting position, so that it resembles an exceedingly small aphid or psocid.

TERMITOXENIA WASMANN.

Thorax with one pair of dorsal appendages, apparently the halteres. Proboscis two-jointed, much produced, styliform or rostriform. Labrum with a styliform appendage anteriorly. Eyes small, ocelli very small. Halteres styliform or hooked at tip. Abdomen much swollen, curved downwards, anus directed forward.

This most remarkable genus is represented by four termitophilous species from Africa and India (Wasmann, '00a). Only females are known, although Wasmann considers some of his specimens as hermaphrodites, as they apparently possessed both ovaries and testes. He says, in speaking of *T. mirabilis*: "Jetzt sehe ich an Schnittserien der letzteren, dass dieselben Hermaphroditen sind mit noch kleinen ovarien und gut entwickelten Hoden." On such evidence we must not, however, suppose that winged males do not occur. Other cases of hermaphroditism among insects have been noted, but in no case is it established to be anything more than a pathological condition of certain individuals.

STETHOPATHUS WANDOLLECK.

Both wings and halteres absent, ocelli present, epistoma not large and prominent. Thorax rounded. Abdomen elliptical, first four dorsal segments strongly chitinized and well developed, covering the greater part of the dorsum of the abdomen. Abdomen not greatly retractile at apex, ovipositor short.

Only one species of this genus has been described, *S. ocellatus* Wand. from the East Indies. The specimens were found upon carrion and in the flowers of the giant Arum (Amorphophallus).

It was previously described by Dahl as the female of his *Puliciphora lucifera*, but because of his poor description and misunderstanding of its systematic position, Wandolleck redescribed it under a new name which it is probably best to adopt.

CHONOCEPHALUS WANDOLLECK.

Wings and halteres wanting, ocelli wanting, eyes small and sunk deeply into the head. Front almost horizontal. Thorax in profile triangular. Abdomen elliptical, with six strongly chitinized dorsal plates which extend far down upon the sides. Sixth ventral plate also present, almost meeting the sixth dorsal. Ovipositor long.

This genus is represented only by *C. dorsalis* Wand., from the Bismarck Archipelago. The imagines were found upon carrion.

In conclusion, I wish to express my greatest thanks and gratitude to Dr. Wm. M. Wheeler for the many kind suggestions and great help which he has given me throughout my work. I take great pleasure in naming one of the species in his honor as a slight token of my appreciation.

BIBLIOGRAPHY.

'94 CHILD, CHARLES M. Ein bisher wenig beachtetes antennales Sinnesorgan der Insekten, mit besonderer Berücksichtigung der Culiciden und Chironomiden. *Zeitschr. f. wiss. Zool.* Bd. lviii, Heft 3 (1894), pp. 475–528, Taf. XXX, XXXI.

'97 COOK, O. F. A New Wingless Fly from Liberia. *Science.* Vol. vi (Dec. 10, 1897), p. 886.

'97 DAHL, FRIEDRICH. Puliciphora, eine neue flohähnliche Fliegengattung. *Zool. Anzeiger.* Bd. xx, Nr. 543 (1897), pp. 409–412.

'00 KELLOGG, VERNON L. An Extraordinary New Maritime Fly. *Biological Bulletin.* Vol. i, No. 2 (January, 1900), pp. 81–87, 3 text-figs.

'57 LOEW, H. Psyllomyia testacea, eine neue Gattung der Phoriden. *Wien. Ent. Monatsschr.* Bd. i (1857), pp. 54–56, Taf. I, Figs. 22–25.

'30 MEIGEN, S. W. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten. Theil vi (1830), Taf. LXIII, Fig. 13.

'90 MEINERT, F. Ænigmatias blattoides, Dipteron novum apterum. *Ent. Med.* Vol. ii (1890), pp. 212–226, Pl. IV.

'81 VERRALL, G. H. Description of a New Genus and New Species of Phoridæ parasitic on Ants. In Lubbock's *Ants, Bees, and Wasps.* pp. 431–435. 1881.

'98a WANDOLLECK, BENNO. Ist die Phylogenese der Aphaniptera entdeckt? *Zool. Anzeiger.* Nr. 553 (1898), pp. 180–182.

'98b WANDOLLECK, BENNO. Die Stethopathidæ, eine neue flügel- und schwingerlose Familie der Diptera. *Zool. Jahrb.*, Abth. f. Syst. Bd. xi (1898), pp. 412–441, Taf. XXV, XXVI.

'98c WANDOLLECK, BENNO. On the Phylogeny of the Flea and the Stethopathidæ. *Naturwiss. Rundschau.* Braunschweig, Nov. 16, 1898.

'00a WASMANN, E. Termitoxenia, ein neues flügelloses physogastres Dipterengenus aus Termitennestern. *Zeitschr. f. wiss. Zool.* Bd. lxvii, Nr. 4 (1900), pp. 599–617, Taf. XXXIII.

'00b WASMANN, E. Neue Dorylinengäste aus dem neotropischen und dem äthiopischen Faunengebiet. *Zool. Jahrb.*, Abth. f. Syst. Bd. xiv, Heft 3 (1900), pp. 1–75, Taf. I, II.

UNIVERSITY OF TEXAS, AUSTIN,
March 1, 1901.

POSTSCRIPT.

After this article had gone to press, the author was so fortunate as to obtain two other new species of Stethopathinæ, even more remarkable than the ones described above. While collecting ants in the vicinity of Austin with Mr. A. L. Melander one afternoon during March, we found in a nest of *Eciton opacithorax* Emery a small insect which by its actions was at once recognized as a member of the Stethopathinæ. On carefully sifting the earth of the nest a second specimen was obtained. On comparing them we were exceedingly surprised to discover that not only were they different from any described Stethopathinæ, but were also quite unlike each other. They are both females which I intend to describe in the near future as representatives of two new genera. From this it would seem that there must be a whole series of these peculiar Diptera living as true myrmecophiles in the nests of various ants.

UNIVERSITY OF TEXAS, AUSTIN,
April 10, 1901.